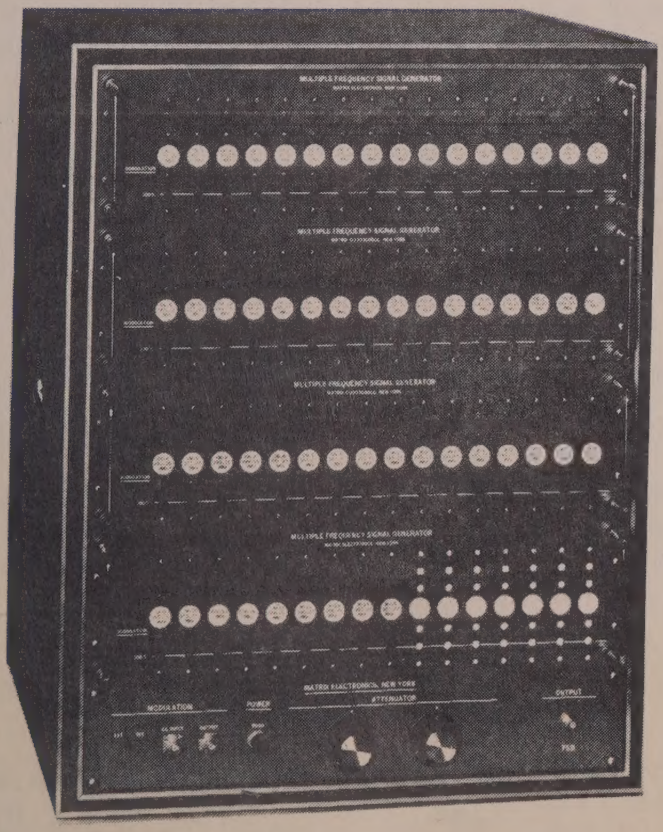
MATRIX TEST EQUIPMENT INCORPORATED

MODEL SX-16

INSTRUCTION MANUAL

MULTIPLE FREQUENCY SIGNAL GENERATOR
MODEL SX-16



SX-16
S/N 436

MATRIX TEST EQUIPMENT INCORPORATED

200 Wood Avenue, Middlesex, New Jersey
08846 Phone: (201) 469-9510

SECTION I

GENERAL INFORMATION

1-1 INTRODUCTION

The Model SX-16 Multiple Frequency Signal Generator is designed to provide laboratory-standard modulated and unmodulated RF carriers for applications where accurate measurements and adjustments are needed. Such applications include CATV and broad band RF systems.

Precise laboratory measurements of signal strength and distortion can be made using the SX-16 and the Matrix Test Equipment Inc. Model R-12 Multiple Frequency Signal Strength and Distortion Analyzer. No other equipment is necessary.

Frequencies are crystal controlled and each channel may be independently selected to be modulated or unmodulated. Each channel is equipped with its own output level and percent modulation controls. In addition, a master 80 dB attenuator, in 1 dB steps, may be used to affect all Generator outputs simultaneously. If desired, an externally-generated modulation may be injected in place of the internally-generated modulation.

SX-16 units may be ordered with any number of Generator modules. As the number of modules increases, however, the maximum output power from each module decreases (see Power output level in Section 1-3).

Many options are available including 0.1 dB resolution in the output attenuator, and Generator frequencies up to 1000 MHz. Contact Matrix Test Equipment Inc. for more information.

1-2 DESCRIPTION

The overall system block diagram of Figure 1-1 describes the functions of the SX-16 unit. The schematics of the Generator and Modulator modules can be found in Appendix A.

1-3 SPECIFICATIONS

Frequencies available:	Any frequency from 5 to 300 MHz.
Power output level:	+57 dBmV per channel for 16 channel units. +52 dBmV per channel for 32 channel units. +47 dBmV per channel for 64 channel units.
Spurious content:	All harmonics and residual modulations guaranteed better than 100 dB down.
Frequency accuracy and stability:	0.003% (carrier and 15.75 KHz internal modulation).
Output Impedance:	75 Ohm
Output Connector:	Type F female (other connectors available)
Modulation:	
Internally-Generated:	15.75 KHz
Externally-supplied	+5 Volts provides 100% downward modulation.
Input impedance:	Approx. 1 K Ohm.
Input connector:	Type BNC female.

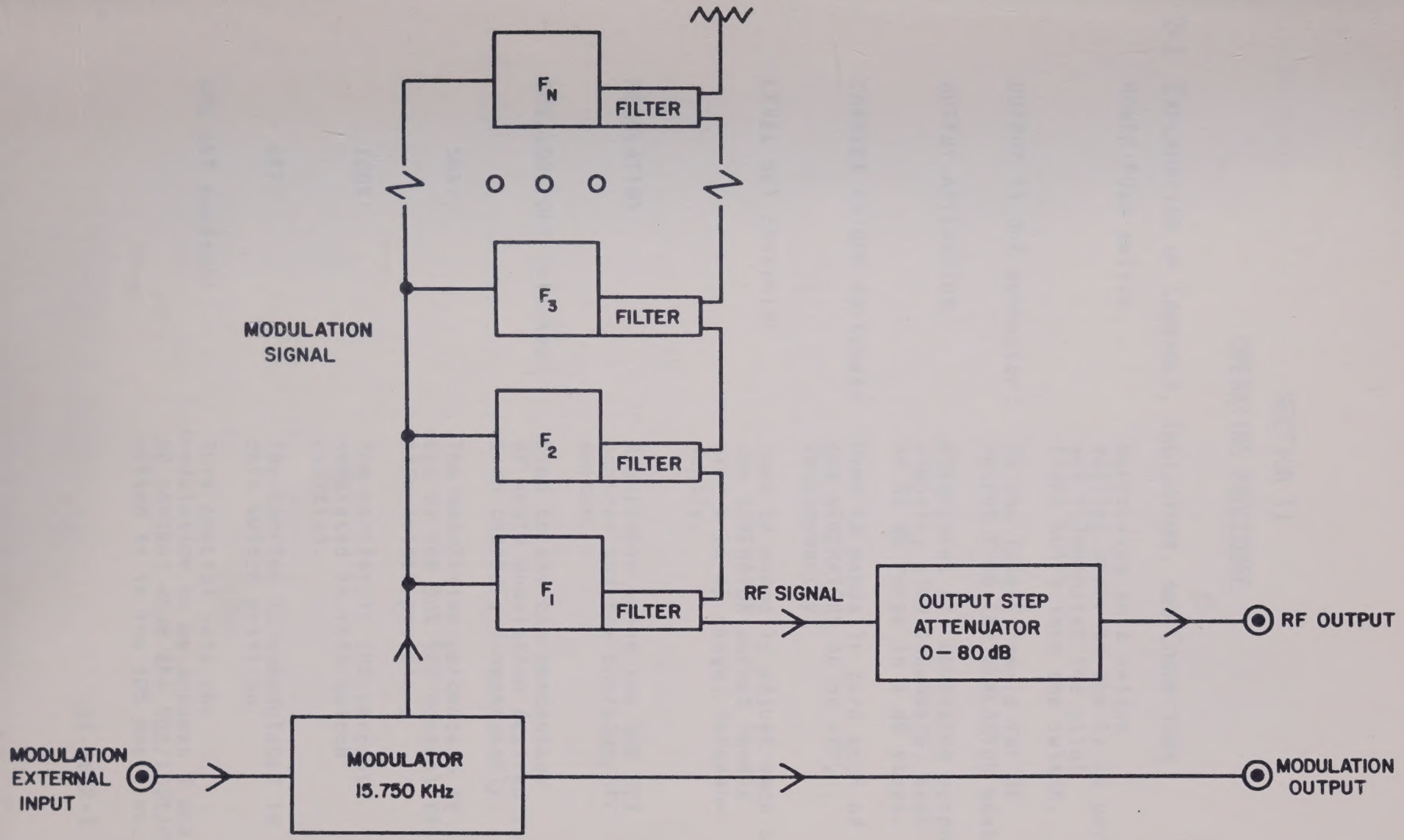


FIGURE 1–1 BLOCK DIAGRAM OF MODEL SX–16 MULTIPLE FREQENCY SIGNAL GENERATOR

SECTION II

OPERATING PROCEDURE

2-1 Explanation of Controls, Indicators, and Connectors

POWER PUSH switch: Depressing this switch applies power to the SX-16 unit and illuminates the pilot light built into the switch.

OUTPUT 75 OHM connector : 75 Ohm Type-F female for RF output from the GENERATOR bank.

OUTPUT ATTENUATOR: Attenuates all GENERATOR output signals, simultaneously, over an 80 dB range in 1 dB steps.

CARRIER ON/OFF switches: Used to manually turn each of the GENERATORS on or off, independently.

LEVEL SET controls: Used to manually adjust each of the GENERATOR output levels over a 15 dB range, independently.

MODULATION: Adjustable using the 50% SET control and the 50%/100%/OFF switch.

50%/100%/OFF switches: Used to set the percentage of audio modulation desired for each channel, independently.

- 50%: The modulation percentage is set by the 50% SET control in this switch position.
- 100%: The carrier is 100 percent modulated in this switch position.
- OFF: The carrier is unmodulated in this switch position.

50% SET control: This control sets the modulation to be between 0 and 80 percent when the 50%/100%/OFF switch is in the 50% position.

MODULATION OUTPUT Jack:	Type BNC Female. Provides a replica of the modulation (internally-or externally-generated) which is being applied to the Generators.
MODULATION EX. INPUT:	Type BNC Female. Externally-supplied modulation is to be injected here when the EXT/OFF/INT switch is in the EXT position.
EXT/OFF/INT switch:	Selects whether the Generators will be modulated by the external source of modulation, unmodulated, or modulated by the internal source of modulation.

2-2 Initial Setting Up of the SX-16 Unit

The following procedures should be followed before using the SX-16. This will insure that the unit is stable and properly adjusted.

2-2.1 Warm-up Procedure

1) Apply power to the SX-16 by depressing the POWER PUSH button. Allow between ten and fifteen minutes for the unit to come up to operating temperature. Because the individual CARRIER ON/OFF switches remove power from the Generator modules, it is advisable that all modules be turned on during this warm-up period by placing the CARRIER ON/OFF switches in the ON position.

2-2.2 Setting the Generator LEVEL SET Controls

1) Set the OUTPUT ATTENUATOR for 10 dB (this is to avoid subsequent signal strength meter overload). Connect the SX-16 OUTPUT to the input of a suitable power meter or to the input of a Matrix Test Equipment Inc. Model R-12 Multiple Frequency Signal Strength and Distortion Analyzer. Any of the Hewlett-Packard power meters are suitable. If a power meter is used that has a 50 Ohm input inpedance, the power will be reduced by only 4% (approximately 0.2 dB).

2) To set the carrier output level, turn off all carriers except the one to be adjusted. The carrier must be unmodulated. This can be most easilly done by placing

the EXT/OFF/INT switch in the OFF position. The desired carrier output level may now be adjusted using the LEVEL SET control. Remember to take into account the 10 dB set on the OUTPUT ATTENUATOR when setting the carrier level.

3) Although the Generator output levels are usually set equal to each other, they can be set at arbitrary levels to compensate for the tilt of certain amplifiers under test. The Generator levels can also be adjusted for specific outputs from the amplifier under test. When outputs are to be set for different levels, place the LEVEL SET control of the carrier whose signal is to have the greatest amplitude in the fully-clockwise position. Use the OUTPUT ATTENUATOR to bring the maximum signal down to the desired level. This is done because it is desireable to have the LEVEL SET controls near the top (clockwise) end of their ranges.

2-3 Using the SX-16

When used with the Model R-12 Distortion Analyzer, normally, all carriers are turned on with all but one of the carrier 100% modulated. This is most easily done by placing the INT/OFF/EXT switch in the INT position (or EXT position if externally-supplied modulation is desired) and placing all but one of the 50%/100%/OFF switches in the 100% position. The carrier that is to be unmodulated should have its 50%/100%/OFF switch in the OFF position.

In a system under test, where distortions and cross-modulation measurements are to be made up to 100 dB down, it may be difficult to shield against leakages of 15.75 KHz from other parts of the system. To avoid any possible confusion as to the source of the 15.75 audio tone, it is advisable to use an externally-supplied modulation of a different frequency so that the distortion caused by the new modulation frequency will not be confused with leakage of 15.75 KHz modulation from other parts of the system.

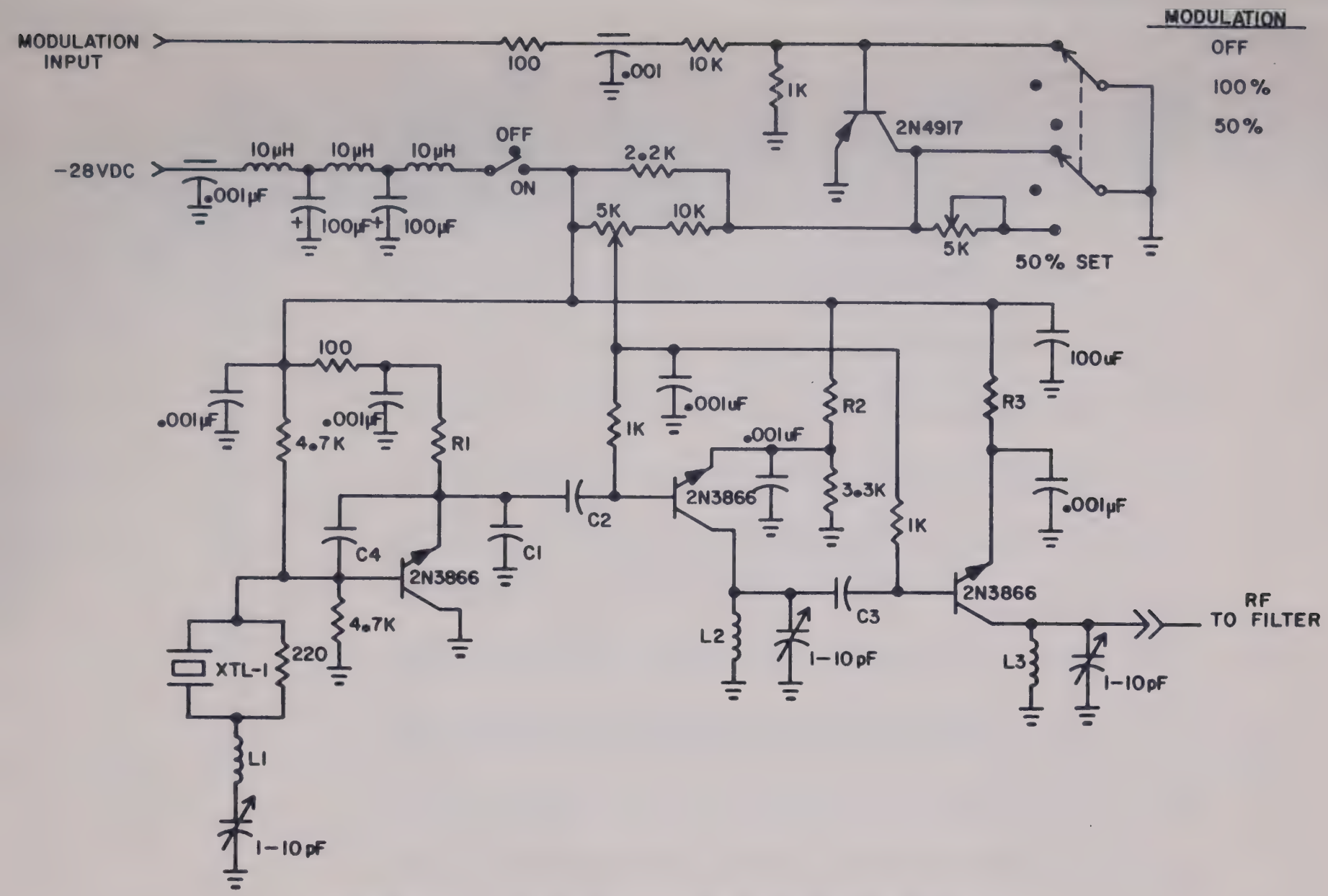


FIGURE A-1 SCHEMATIC FOR GENERATOR MODULE

CHANNEL (FREQUENCY)	C1 pF	C2 pF	C3 pF	C4 pF	L1 µH	L2 µH	L3 µH	R1 Ω	R2 Ω	R3 Ω
2	68	68	10	47	1.2	.27	.27	1.2K	560	470
3	68	68	10	47	1.2	.27	.27	1.2K	560	390
4	47	47	10	47	1.2	.22	.22	1.2K	560	390
5	47	47	10	47	1.0	.22	.22	1.0K	560	330
6	33	33	10	47	.82	.18	.18	1.0K	470	330
A, B	68	68	10	47	1.2	.10	.12	680	270	180
C, D	47	47	10	47	1.2	5T	5T	680	270	180
E	47	47	10	47	1.0	5T	5T	680	270	180
F, G	47	47	10	47	10	4T	4T	680	270	180
H	33	33	10	47	10	4T	4T	680	270	180
I	33	33	10	47	.82	4T	4T	680	270	180
7	47	47	10	47	.82	4T	4T	680	270	180
8	33	33	10	47	.82	4T	4T	680	270	180
9	33	33	10	47	.68	3T	3T	680	270	180
10	20	33	10	47	.68	3T	3T	680	270	180
11	20	20	10	47	.56	3T	3T	680	270	180
12, 13	15	20	10	47	.47	3T	3T	680	270	180
J	33	67	10	47	1.0	3T	3T	680	270	180
K, L	33	47	10	47	1.0	3T	3T	680	270	180
M	22	47	10	47	1.0	2T	2T	680	270	180
N, O, P	22	47	10	47	.82	2T	2T	680	270	180
Q	15	33	10	47	.82	2T	2T	680	270	180
R, S, T	15	33	10	47	.68	2T	2T	680	270	180
U	10	22	10	47	.56	2T	2T	680	270	180
V	10	22	10	47	.56	1T	1T	680	270	180
W, X	10	22	10	47	.47	1T	1T	680	270	180
100 MHz	15	20	10	47	.47	3T	3T	680	270	180
108 MHz	47	68	10	47	1.5	3T	3T	680	270	180
109.25 MHz	47	47	10	47	1.5	3T	3T	680	270	180
110.5-139 MHz	47	47	10	47	1.2	3T	3T	680	270	180
144 MHz	33	47	10	47	1.2	3T	3T	680	270	180
156-225 MHz	33	47	10	47	1.0	3T	3T	680	270	180
266.5 MHz	20	33	10	47	.82	3T	3T	680	270	180

FIGURE A-2. TABLE OF PARTS VALUES FOR GENERATOR MODULES.

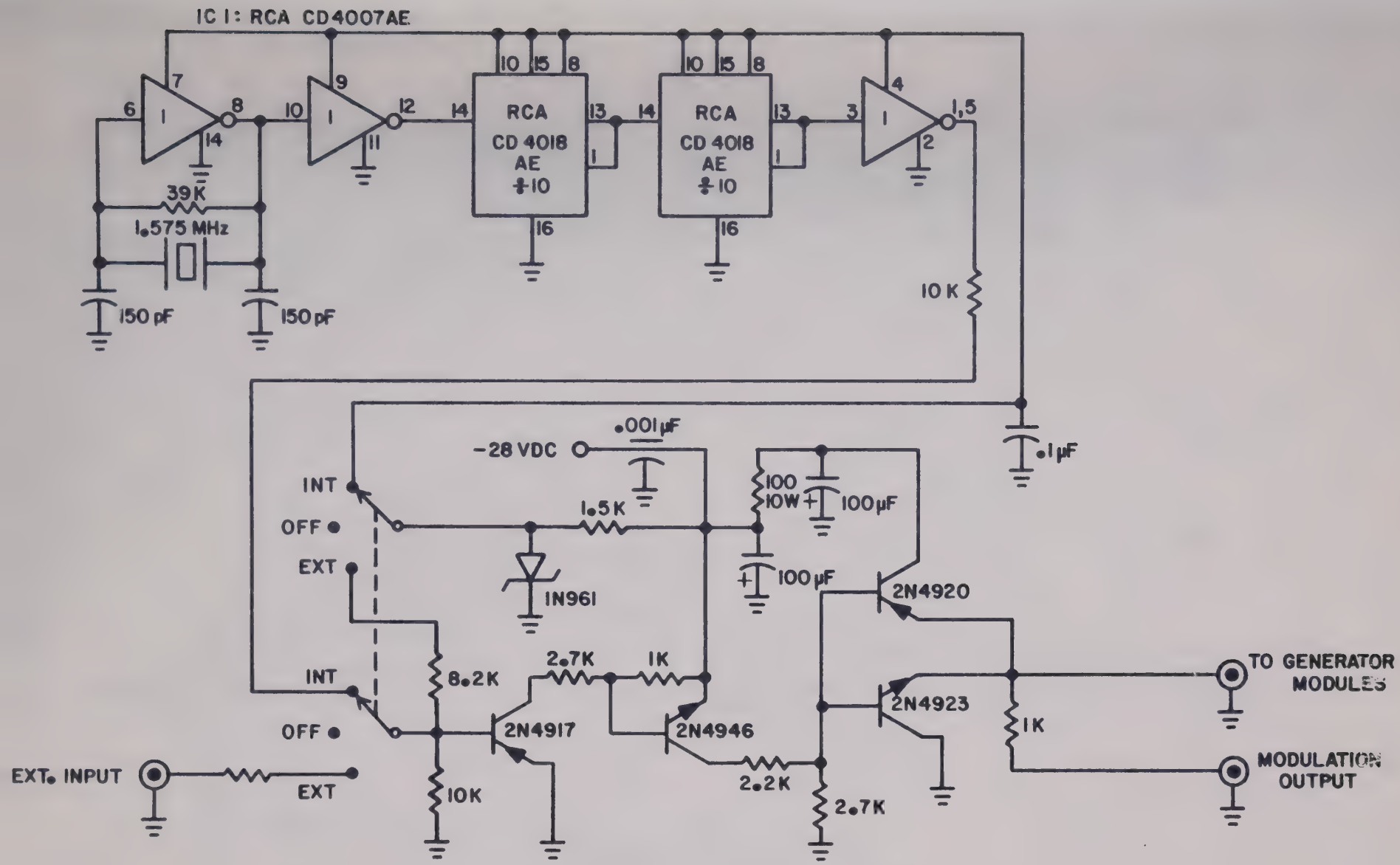
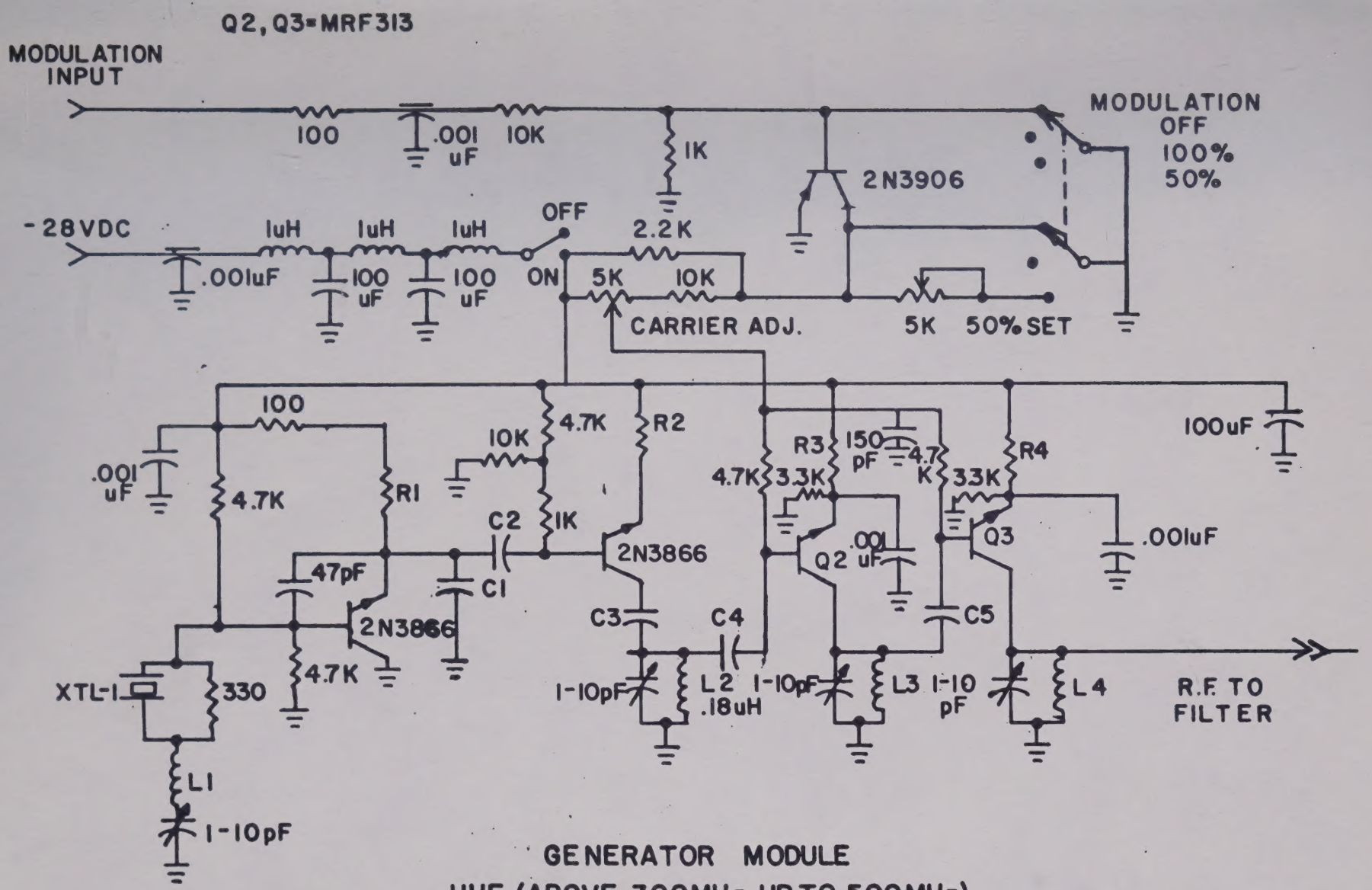
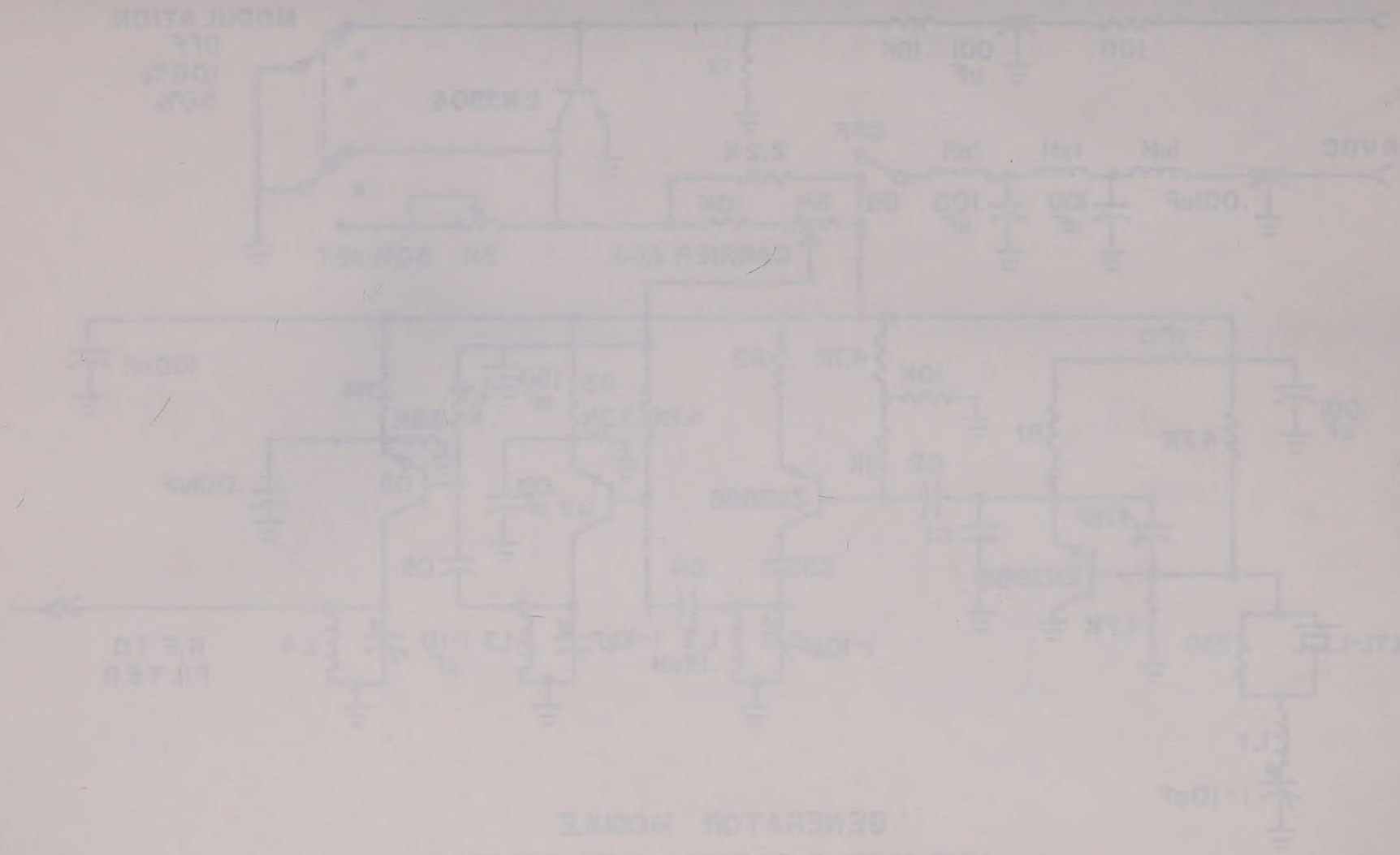


FIGURE A-3 SCHEMATIC FOR MODULATOR



GENERATOR MODULE

UHF (ABOVE 300MHz UP TO 500MHz)



www.manualsplus.com
1011055